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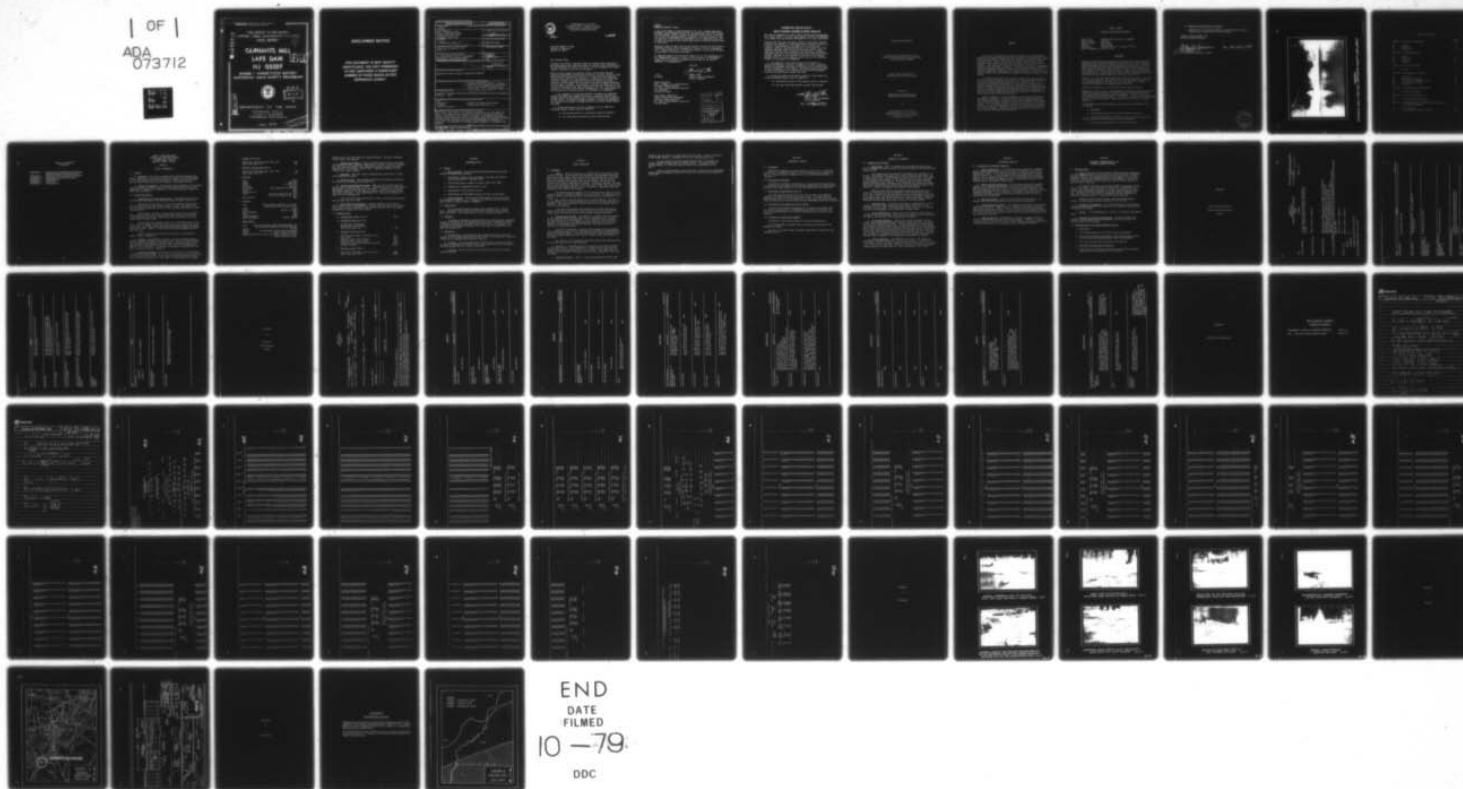
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NATIONAL DAM SAFETY PROGRAM. OLIPHANTS MILL LAKE DAM (NJ-00397)--ETC(U)
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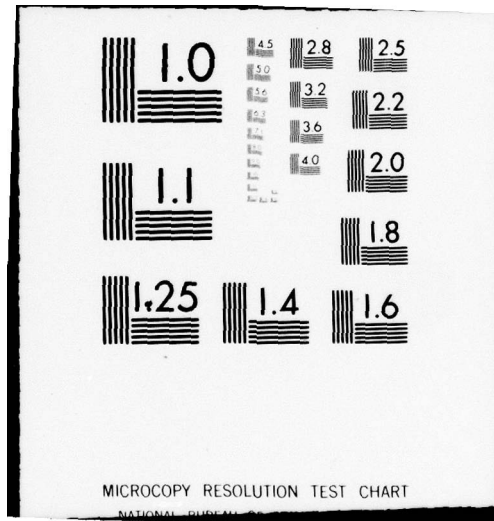
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DELAWARE RIVER BASIN
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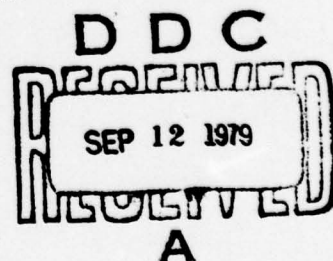
OLIPHANTS MILL

LAKE DAM

LEVEL

NJ 00397

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

June, 1979

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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| 1. REPORT NUMBER NJ00397 | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER |
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| 18. SUPPLEMENTARY NOTES Copies are obtainable from National Technical Information Service, Springfield, Virginia, 22151. | | |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams Embankments Spillways Structural analysis National Dam Inspection Act Report Oliphants Mill Lake Dam, N.J. | | |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report. 410 760 | | |



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**DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE-2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106**

24 AUG 1979

**Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, NJ 08621**

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Oliphants Mill Lake Dam in Burlington County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Oliphants Mill Lake Dam, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in overall good condition. However, the overflow portion of the headwall is in poor condition with many boards severely deteriorated and the timber sheeting of the weir crest is missing. The spillway is considered inadequate since 19% of the Spillway Design Flood -SDF- would overtop the dam. (The SDF, in this instance, is one half of the Probable Maximum Flood.) To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The adequacy of the spillway should be determined by a qualified professional consultant, engaged by the owner, using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. Within six months of the date of approval of this report the following remedial actions should be completed:

- (1) The overflow portion of the spillway should be repaired.**
- (2) All trees and brush should be removed from the dam.**

NAPEN-D

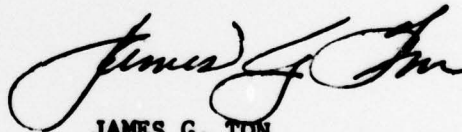
Honorable Brendan T. Byrne

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Edwin B. Forsythe of the Sixth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

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Division of Water Resources
N.J. Dept. of Environmental Protection
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OLIPHANTS MILL LAKE DAM (NJ00397)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 13 April 1979 by O'Brien and Gere Engineers, Inc., under contract to the U.S. Army Engineer District, Philadelphia, in accordance with the National Dam Inspection Act, Public law 92-367.

Oliphants Mill Lake Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in overall good condition. However, the overflow portion of the headwall is in poor condition with many boards severely deteriorated and the timber sheeting of the weir crest is missing. The spillway is considered inadequate since 19% of the Spillway Design Flood -SDF- would overtop the dam. (The SDF, in this instance, is one half of the Probable Maximum Flood.) To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The adequacy of the spillway should be determined by a qualified professional consultant, engaged by the owner, using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. Within six months of the date of approval of this report the following remedial actions should be completed:

- (1) The overflow portion of the spillway should be repaired.
- (2) All trees and brush should be removed from the dam.

APPROVED: 

JAMES G. TON

Colonel, Corps of Engineers
District Engineer

DATE: 27 August 1979

DELAWARE RIVER BASIN

Name of Dam: Oliphants Mill Lake Dam
County & State: Burlington County, New Jersey
Inventory Number: NJ 00397

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Prepared by:

O'BRIEN & GERE ENGINEERS, INC
JUSTIN & COURTNEY DIVISION

For

DEPARTMENT OF THE ARMY
Philadelphia District, Corps of Engineers
Custom House-2nd & Chestnut Streets
Philadelphia, PA 19106

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE 1 REPORT

NATIONAL DAM INSPECTION PROGRAM

Name of Dam: Oliphants Mill Lake Dam ID #NJ00397
State Located: New Jersey
County Located: Burlington
Stream: Haynes Creek
Coordinates: Latitude 39° 53.1', Longitude 74° 49.9'
Date of Inspection: April 13, 1979

ASSESSMENT

Based on visual observations made of the Oliphants Mill Lake Dam (owned by the Oakwood Lakes Colony Club, Medford, New Jersey) during the inspection, information made available by New Jersey DEP, and conversations with the Owner's representative the earth embankment portion of the structure and the sidewall and headwall extension members of the creosoted timber spillway appear to be in overall good condition. However, the overflow portion of the headwall is in relatively poor condition with many boards severely deteriorated and the timber sheeting of the weir crest is missing.

The dam is an earth embankment approximately 200 feet long and 11 feet high at its maximum section. The spillway is a creosoted timber structure with a weir approximately 64 feet long. The 30 acre reservoir is used for recreation by members of the Oakwood Lakes Colony Club.

The dam is considered to be in the "Significant" hazard category.

Examination of the results of the hydrologic and hydraulic analyses indicate that the spillway is capable of passing 18 percent of the Spillway Design Flood (SDF) without overtopping of the embankment. The SDF is 50 percent of the Probable Maximum Flood (PMF). The spillway is classified as "Inadequate" but not "Seriously Inadequate" because the dam is a "Significant" hazard structure.

Recommendations and remedial measures which should be initiated soon are as follows:

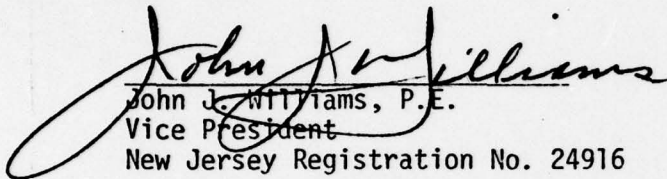
a. Facilities

1. The overflow portion of the spillway should be repaired.
2. A detailed hydrologic and hydraulic study should be made and the need and type of mitigating measures should be determined.
3. All trees and brush should be removed from the dam.

b. Operation and Maintenance Procedures

1. Continuation of the present operation and maintenance procedures appears to be satisfactory for this structure.

O'BRIEN & GERE ENGINEERS, INC.
JUSTIN & COURTNEY DIVISION


John J. Williams, P.E.
Vice President
New Jersey Registration No. 24916

Date: 30 JULY 1979





*OVERVIEW
OLIPHANTS MILLS LAKE DAM, BURLINGTON COUNTY, NEW JERSEY*

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PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
OLIPHANTS MILL LAKE DAM
INVENTORY NUMBER - NJ00397

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. This report is authorized by the Dam Inspection Act, Public law 92-367, and has been prepared in accordance with contract #DACW 61-78-C-0052 between O'Brien & Gere Engineers, Justin & Courtney Division and the United States Army Corps of Engineers, Philadelphia District.

b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic condition of the Oliphants Mill Lake Dam and appurtenant structures and to determine if the dam constitutes a hazard to human life of property.

1.2 Project Description.

a. Description of Dam and Appurtenances. (Information obtained from the New Jersey Department of Environmental Protection (DEP) Trenton, NJ)

Oliphants Mill Lake Dam is an earth fill embankment approximately 200 feet long with a maximum height of about 11 feet. The width of the top of the dam averages about 26 feet and the upstream and downstream slopes are about 2H:1V.

The spillway is 64 feet- 7 inches wide and consists of creosoted timber sheeting with rock fill (average one cubic foot) on a 2H:1V slope on the downstream side of the sheeting and sandy clay backfill on the upstream side on a 2H:1V slope.

The reservoir drain system consists of a reinforced concrete inlet race, a 36-inch diameter seating head sluice gate on the downstream endwall of the race, and 25 feet of 36-inch diameter, bituminous coated, corrugated metal outlet pipe. There is a steel trash rack on the upstream opening of the inlet race.

Further details of the spillway and reservoir drain system are shown on Sheet 2, Appendix E.

b. Location. Oliphants Mill Lake Dam is located on Haynes Creek in Medford Township, Burlington County, New Jersey. The site is approximately one mile upstream of Medford, a community with a 1970 population of 1,448, and is shown on USGS Quadrangle entitled, "Mt. Holly, NJ" at coordinate N39° 53.1' and W 74° 49.9'. A regional location map of Oliphants Mill Lake Dam is enclosed as Plate 1, Appendix E.

c. Size Classification. Oliphants Mill Lake Dam has a maximum height of about 11 feet which places it in the "Small" size dam category for height because it is less than 40 feet high. It has a maximum storage capacity of about 180 acre-feet which places it in the "Small" size dam category for storage

e. Storage (Acre-Feet).

| | |
|--|-----|
| Normal Pool, Recreation Pool, Elev. 29.0 | 90 |
| Top of Dam, Elev. 31.2 | 182 |

f. Reservoir Surface Area (Acres).

| | |
|--|----|
| Normal Pool, Recreation Pool, Elev. 29.0 | 30 |
| Top of Dam, Elev. 31.2 | 50 |

g. Dam Data.

| | |
|-----------------|---|
| Type | Earth |
| Length | +200 feet |
| Height | 11.2 feet (Max) |
| Top Width | +26 feet |
| Side Slopes | 2H:1V (upstream & downstream) |
| Zoning | None |
| Impervious core | None |
| Cutoff | Creosoted Timber Wall 109 feet long in the middle of the dam. |
| Grout Curtain | None |

h. Spillway.

| | |
|--------------------|--|
| Type | Creosoted timber sheeting; for further description refer to Section 1.2.a. |
| Width | 1-foot |
| Length | 64 feet -7 inches |
| Crest Elevation | 29.0 |
| Gates | None |
| Upstream Channel | None |
| Downstream Channel | Natural Channel |

i. Outlet Works.

| | |
|-----------------------|--|
| Type | 36 inch bituminous coated corrugated metal pipe with reinforced concrete race on upstream end. |
| Length | 25 feet |
| Closure | 36-inch diameter seating head sluice gate |
| Access | Across crest of spillway. |
| Regulating facilities | Hoist with wheel to regulate 36-inch seating head sluice gate. |

because it has less than 1,000 Ac.Ft.maximum storage. The dam is therefore in the "Small" size category.

d. Hazard Classification. There are three residences within the flood plain within the first 1,500 feet downstream of the dam. Failure of Oliphants Mill Lake Dam would probably cause appreciable property damage, but there would be little likelihood of loss of life. Therefore, the dam is in the "Significant" hazard category.

e. Ownership. The dam is owned by Oakwood Lakes Colony Club, 7 Cedar Trail, Medford, NJ 08055.

f. Purpose of Dam. The impoundment behind the dam provides recreation for members of the Oakwood Lakes Colony Club.

g. Design and Construction History. There are no records of when the original dam at Oliphants Mill was built. Sometime prior to 1954, the original dam breached leaving a 90-foot gap in the center. In 1954 the S & F Realty Development Company had the dam rebuilt to provide lake front properties for real estate development. Earl Higginbotham (P.E., New Jersey) prepared the design for the reconstruction.

Since the major reconstruction work of 1954, only general maintenance work has been done on the dam.

h. Normal Operating Procedures. Periodic opening of the reservoir drain gate to lower the impoundment for cleaning the lake bottom, maintenance work on the dam, and inspection of the dock and floating raft is the extent of operating procedures for the structure.

1.3 Pertinent Data.

a. Drainage Area (Square miles). 25.5

b. Discharge at Dam site (cfs).

No high pool or discharge records were made available.

Top of Dam, Elev. 31.2 750

c. Elevation (Feet above MSL).

Spillway Crest (normal, recreation pool) 29.0

Top of Dam 31.2

Reservoir Drain Invert (inlet) 20.5

Reservoir Drain Invert (outlet) 20.4

Streambed at the downstream toe of the dam 20.0±

Maximum Tailwater 24.0±

d. Reservoir Length (Feet),

Normal Pool, Recreation Pool, Elev. 29.0 3,800

Top of Dam, Elev. 31.2 3,800

SECTION 2

ENGINEERING DATA

2.1 Design .

a. Data Available. The engineering data made available by the New Jersey DEP includes the following:

1. Application, report on the application, and permit for repairs on the Oliphants Mill Lake Dam (1959).
2. State of New Jersey inspection reports (1954, 1957, 1970).
3. Dewatering of impoundment approval (1973).
4. Two pictures of the spillway section.
5. Miscellaneous correspondence between the State and the Owner.

b. Design Features. The principal design features for the structure are discussed in Section 1.2.a. Drawings of the spillway and the reservoir drain system are shown on Sheet 2, Appendix E.

2.2 Construction .

It is not known when the original dam at Oliphants Mill Lake was built. Sometime prior to 1954 the original dam breached leaving a 90-foot gap in the center. The reconstruction in 1954 is discussed Section 1.2.g.

2.3 Operation .

According to the Owner's representative, Mr. Steven Corcoran, operating records are maintained by the Oakwood Lakes Colony Club. Operation is limited to periodic opening of the reservoir drain gate to lower the impoundment for cleaning the lake bottom, maintenance work on the dam, and inspection of the dock and floating raft.

2.4 Evaluation .

a. Availability. The engineering data reproduced for this report and studied for this investigation were provided by DEP. No information is available concerning the embankment and foundation materials.

b. Adequacy. The information made available by DEP, conversations with the Owner's representative and observations made during the field investigation provided adequate data for a Phase I evaluation.

c. Validity. There is no reason to question the validity of the data obtained from DEP.

SECTION 3

VISUAL INSPECTION

3.1 Findings .

a. General. The field inspection of Oliphants Mill Lake Dam took place on April 13, 1979. At the time of the inspection, the impoundment was being drawn down so that repairs could be made on the overflow portion of the headwall of the timber spillway, the debris on the bottom of the lake in the vicinity of the dock and floating raft could be cleared, and the dock and floating raft could be inspected by the Owner. During the inspection the water level in the impoundment was about 4 feet below the spillway crest and the draw-down operation continued during the entire inspection. Underwater areas were inspected to the limit of the drawdown.

The observations and comments of the field inspection team are in the checklist which is included in Appendix B of this report. The appearance of the facility indicates that the dam and its appurtenances are satisfactorily maintained.

b. Dam. Overall, the dam appears to be in good condition. The top of the dam and both the upstream and downstream slopes are for the most part well vegetated. There are a few minor erosion gullies on the downstream slope towards the right abutment.

A few trees with maximum trunk diameters of 6 inches and maximum heights of 20 feet are located on the top of the dam and along the upstream slope between the spillway and the right abutment (looking downstream).

c. Appurtenant Structures. The sidewall and headwall extension members of the creosoted timber spillway appear to be in good condition. However, the overflow portion of the headwall is in poor condition with many boards severely deteriorated and the timber sheeting of the weir crest is missing. The Owner's representative stated that the weir crest sheeting was torn loose by ice during the winter.

The rock fill which has a surface slope of about 2H:1V with angular units averaging one cubic foot in size appears to be stable on the downstream side of the timber headwall. The sandy clay backfill on the upstream side of the timber headwall which also has a surface slope of about 2H:1V appears to be stable.

The reservoir drain system was functioning during the inspection and, as observed, seems to be in good condition.

d. Reservoir. A reconnaissance of the reservoir disclosed no evidence of excessive siltation, slope instability, or other features that would adversely effect the storage capacity of the reservoir. The slopes along the perimeter of the reservoir are vegetated and on gentle gradients of less than 10 percent.

e. Downstream Channel. There is a bridge opening about 250 feet down-

stream of the dam which is 40 feet wide and 10 feet high. Because of the size of the bridge opening, it probably will not be an obstruction to flow.

For approximately one mile between Oliphants Mill and Medford, the channel meanders through wooded and swampy terrain. The channel gradient averages about 2 to 3 feet per mile for several miles downstream of the dam.

There are approximately a dozen homes which could experience appreciable damage during the passage of the SDF in the 2 miles along the creek downstream of the dam.

SECTION 4

OPERATIONAL FEATURES

4.1 Procedures .

Operational procedures have been covered in Section 1.2.h. According to the Owner's representative, there are no written operating procedures for the dam. Normal operating procedures for this structure do not require a dam tender.

4.2 Maintenance of the Dam .

According to the Owner's representative, the Oakland Lakes Colony Club is responsible for and maintains the dam which appears to be in good condition except for the timber headwall of the spillway which needs to be repaired.

4.3 Maintenance of Operating Facilities .

The only operating facility associated with the dam is the handwheel operated sluice gate of the reservoir drain system. The sluice gate and appurtenances appear to be well maintained and seem to be functioning properly since the gate was fully open and draining the impoundment during the inspection.

4.4 Description of any Warning System in Effect .

According to the Owner's representative, the local Civil Defense (CD) has a warning system which is implemented during times of high flow. CD also has evacuation plans which could be implemented if such measures were necessary.

4.5 Evaluation of Operational Adequacy .

The reservoir drain system appears to function satisfactorily.

It is assumed the CD warning system and evacuation plan would be implemented as needed.

The dam is accessible under all weather conditions for inspection and emergency action.

SECTION 5

HYDRAULICS & HYDROLOGY

5.1 Evaluation of Features.

a. Design Data. There is no hydraulics and hydrology design information available from DEP for either the original design or the reconstruction design of 1954.

The drainage basin contributing to Oliphants Mill Lake Dam is "V" shaped. The length of the longer leg is about 8 miles and the shorter leg is about 5 miles long. Ground elevations range from 219 to 24. The slopes of the drainage basin adjacent to the reservoir are gentle with gradients varying between 2 and 10 percent. The drainage basin is about 70 percent wooded, 20 percent lakes and swamps, and 10 percent open fields and meadows. The runoff characteristics of the drainage basin may undergo changes in the future as a result of residential and commercial development.

There are more than 60 impoundments within the drainage basin upstream of Oliphants Mill Lake Dam ranging in size from Centennial Lake which has a surface area of about 50 acres down to small ponds and marshes of an acre or two. The surface elevations for these impoundments range from approximately Elevation 130 to Elevation 35. Most of the lakes and ponds have been formed by dams which have a variety of spillway systems.

b. Experience Data. According to the Owner's representative, no discharge or reservoir stage records are maintained for this site and no estimates could be given. From experiences through the years, Mr. Corcoran said that the impoundment can be drawn down in about 2 days.

c. Visual Observations. On the day of the inspection there were no indications that the spillway could be obstructed other than the accumulation of trash on the reservoir drain system hoist and pedestal.

d. Overtopping Potential. The Spillway Design Flood (SDF) for the "Small" size "Significant" hazard structure has been selected as 50 percent of the Probable Maximum Flood (PMF). The SDF hydrograph was routed through the reservoir with the starting water surface Elevation 29.10. The maximum water surface elevation in the reservoir resulting from the SDF routing would be 4.7 feet above the spillway crest and 2.5 feet above the top of the dam. The SDF has a peak inflow of 3870 and a peak outflow of 3850 cfs. The spillway is capable of discharging 18 percent of the SDF without overtopping of the dam (Refer to Appendix C for computations and computer printouts).

e. Spillway Adequacy. Even though the spillway is only capable of discharging 18 percent of the SDF (0.5 PMF) the spillway is considered as "Inadequate" but not "Seriously Inadequate" because the structure is a "Small" size, "Significant" hazard dam. Failure of the dam could cause appreciable property damage, but there would be little likelihood of loss of life.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. It is assumed the dam's stability is adequate based on the fact that there has been no signs of instability since it was constructed in 1954. At the time of the inspection the dam had no visible signs of instability. In the spillway section of the dam the well graded rock fill with a surface slope of 2H:1V on the downstream side of the timber headwall and the sandy clay embankment with a surface slope of 2H:1V on the upstream side of the headwall appear stable.

b. Design and Construction Data. The spillway cross-section geometry appears to be in general conformance with the As-Built drawings for the reconstruction of the spillway in 1954. There are no drawings available for the earth embankment portion of the dam. No information on stability analysis, seepage computations, or soil properties is available. There also is no information available concerning construction supervision for the 1954 reconstruction of the spillway.

c. Operating Records. According to the Owner's representative, the Oakwood Lakes Colony Club maintains operating records for the dam.

d. Post Construction Changes. Since there are no records of the original design and construction, there is no way of knowing exactly what constituted the original structure. Sometime prior to 1954 the S & F Realty Development Company had the dam rebuilt with a creosoted timber spillway (Sheet 2, Appendix E). Since the major reconstruction work of 1954, only general maintenance work has been done on the dam.

e. Seismic Stability. Oliphants Mill Lake Dam is located in Seismic Zone 1 of the "Seismic Zone Map of Contiguous States." Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected Zone 1 earthquake conditions.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment .

a. Safety. Based on visual observations made during the inspection, the earth embankment portion of the structure and the sidewall and headwall extension members of the creosoted timber spillway appear to be in good condition. However, the overflow portion of the headwall is in poor condition with many boards severely deteriorated and the timber sheeting of the weir crest is missing.

As stated in Section 5.1.d, the SDF selected is 50 percent of the PMF for this "Small" size, "Significant" hazard dam. Examination of the results of the hydrologic and hydraulic analyses indicate that the spillway is capable of passing 18 percent of the SDF without overtopping the dam. The spillway is classified as "Inadequate" but not "Seriously Inadequate" because the dam is a "Significant" hazard structure.

Failure of the dam would probably cause appreciable property damage, but there would be little likelihood of loss of life.

b. Adequacy of Information. The information available from DER and observation made during the field inspection, are adequate to make a Phase 1 evaluation of the dam.

c. Urgency. The recommendations in Section 7.2 should be implemented soon.

d. Necessity for Further Investigation. Detailed hydrologic and hydraulic studies should be made to determine the extent to which the spillway needs to be increased.

7.2 Recommendations and Proposed Remedial Measures .

a. Facilities.

1. The overflow portion of the spillway should be repaired.
2. A detailed hydrologic and hydraulic study should be made and the need and type of mitigating measures should be determined.
3. All trees and brush should be removed from the dam.

b. Operation and Maintenance Procedures.

1. Continuation of the present operation and maintenance procedures appears to be satisfactory for this structure.

APPENDIX

A

Check List Engineering Data
Design, Construction, Operation
Phase I

NAME OF DAM Oliphants Mill Lake Dam

ID # NJ 00397

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

Sheet 1 of 4

ITEM

REMARKS

AS-BUILT DRAWINGS

The only As-Built drawings available from DEP are for the creosoted timber spillway as reconstructed in 1954

REGIONAL VICINITY MAP

Refer to Plate 1, Appendix E

CONSTRUCTION HISTORY

There are no records of when the original dam at Oliphants Mill was built. Sometime prior to 1954, the original dam breached leaving a 90-foot gap in the center. In 1954 the S&F Realty Development Co. had the dam rebuilt to provide lake front properties for real estate development. E. Higginbotham (P.E., New Jersey) prepared the design for the reconstruction. Since the major reconstruction, only general maintenance has been done.

TYPICAL SECTIONS OF DAM

Refer to Sheet 2, Appendix E

OUTLETS - PLAN

Refer to Sheet 2, Appendix E

DETAILS

CONSTRAINTS

DISCHARGE RATINGS Refer to Appendix C

RAINFALL/RESERVOIR RECORDS Not recorded

| ITEM | REMARKS |
|---|---|
| DESIGN REPORTS | None available from DEP |
| GEOLOGY REPORTS | None available from DEP. Refer to Appendix F of this report |
| DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES | No data available from DEP |
| MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD | No data available from DEP |
| POST-CONSTRUCTION SURVEYS OF DAM | According to the Owner's representative, there has not been any post-reconstruction surveys of the dam. |
| BORROW SOURCES | Unknown |

| ITEM | REMARKS |
|---|---|
| MONITORING SYSTEMS | There are no monitoring systems associated with this structure. |
| MODIFICATIONS | The major modification to the original dam was the installation of the creosoted timber spillway in 1954 following a breaching of the dam sometime prior to 1954. |
| HIGH POOL RECORDS | There are no pool records maintained for this site. |
| POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS | An engineering study of the structure was made in 1968. This was when Oakwood Lakes Colony Club bought the structure. |
| PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS | Sometime prior to 1954 the original dam breached leaving a 90-foot gap in the center of the dam. |
| MAINTENANCE OPERATION RECORDS | Maintenance & operating records are maintained by the Oakwood Lakes Colony Club. |

ITEM

REMARKS

SPILLWAY PLAN

SECTIONS

DETAILS

Refer to Sheet 2, Appendix E

OPERATING EQUIPMENT
PLANS & DETAILS

Limited information on Sheet 2, Appendix E

MISCELLANEOUS

Engineering data available from the DEP files is
listed in Section 2.1.a of this report.

APPENDIX

B

Check List
Visual Inspection
Phase I

Sheet 1 of 8

National

22+₋ M.S.L.

| | | |
|------------|-----------------|----------------|
| Lee DeHeer | Leonard R. Beck | David Campbell |
| | | |
| | | |

Recorder

We are accompanied on our inspection by:

Steven Corcoran, President, Oakwood Lakes Colony Club, 7 Cedar Trail, Medford, N.J. 08055

George Rankin, Vice-President, Oakwood Lakes Colony Club

Harold Eastlick, Township Administrator & Clerk, Medford, Township, N.J.
"Kip" Feiffer, Medford Township Civil Defense Coordinator

EMBANKMENT

Sheet 2 of 8

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
|--|--------------------------|-----------------------------------|
| SURFACE CRACKS | None Observed | None |
| UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE | None Observed | None |
| SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES | None Observed | None |
| VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST | No Misalignment Observed | None |
| RIPRAP FAILURES | None Observed | None |

EMBANKMENT

Sheet 3 of 8

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
|------------------------------|---------------------|-----------------------------------|
|------------------------------|---------------------|-----------------------------------|

| | | |
|---|--|--|
| JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM | | |
|---|--|--|

No problems observed

None

| | | |
|------------------------|--|--|
| ANY NOTICEABLE SEEPAGE | | |
|------------------------|--|--|

None observed

None

| | | |
|-------------------------|--|--|
| STAFF GAGE AND RECORDER | | |
|-------------------------|--|--|

None observed

None

| | | |
|--------|--|--|
| DRAINS | | |
|--------|--|--|

According to available information
there is no drainage system

None

OUTLET WORKS

Sheet 4 of 8

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--|---|----------------------------|
| CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT | Not applicable because the outlet conduit is bituminous coated corrugated metal pipes (BCCMP) 36 inches in diameter. | None |
| INTAKE STRUCTURE | The reinforced concrete inlet race appears to be in good condition. | None |
| OUTLET STRUCTURE | The BCCMP outlets into a pool approximately 200 feet long and 100 feet wide. The banks of the pool appear to be stable | None |
| OUTLET CHANNEL | The outlet channel appears stable. It is on a very gentle gradient of about 10 feet in 3 miles | None |
| EMERGENCY GATE | The 36 inch diameter seating head sluice gate is operational since it was opened to draw the lake down during the inspection. The gate hoist and stem appear to be in good condition | None |

UNGATED SPILLWAY

Sheet 5 of 8

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
|------------------------------|---|---|
| WOOD WEIR | The wooden weir needs to be repaired. The timber sheeting which makes up the weir crest is missing. The Owner's representative stated that the weir crest sheeting was torn loose by ice forces during the winter | The spillway headwall must be repaired. |
| APPROACH CHANNEL | The only possible obstruction to flow over the spillway weir would be the accumulation of trash on the reservoir drain system hoist and pedestal. | None |
| DISCHARGE CHANNEL | Flow over the weir of the spillway outlets into a pool approximately 200 feet long and 100 feet wide. The banks of the pool appear stable. The discharge channel flows through a bridge opening about 40 feet wide and 10 feet high about 250 feet downstream of the dam. | None |
| BRIDGE AND PIERS | N/A | None |

INSTRUMENTATION

Sheet 6 of 8
REMARKS OR RECOMMENDATIONS

VISUAL EXAMINATION

OBSERVATIONS

MONUMENTATION/SURVEYS

None

None

OBSERVATION WELLS

None

None

WEIRS

None

None

PIEZOMETERS

None

None

OTHER

None

None

RESERVOIR

Sheet 7 of 8

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--------------|----------------------------|
|-----------------------|--------------|----------------------------|

SLOPES

The slopes along the perimeter of the reservoir are vegetated and on gentle gradients. From observations, there does not appear to be any unstable slopes

None

SEDIMENTATION

For the most part, the perimeter of the reservoir is residentially developed. There is no evidence of excessive siltation, slope instability, or other features that would adversely affect the storage capacity of the reservoir.

None

DOWNSTREAM CHANNEL

Sheet 8 of 8

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|--|
| CONDITION (OBSTRUCTIONS, DEBRIS, ETC.) | There is a bridge opening about 250 feet downstream of the dam which is 40 feet long and 10 feet high. The approximately one mile of channel between Oliphants Mill and Medford meanders through wooded and swampy terrain. | Because of the size of the bridge opening, it probably will not be an obstruction to flow. |
| SLOPES | The channel gradient averages about 2 to 3 feet per mile for many miles downstream of the dam. | None |
| APPROXIMATE NO. OF HOMES AND POPULATION | There are approximately a dozen homes which would be affected by flood flows in the 2 miles along the creek downstream of the dam | According to the Owner's representative and the Civil Defense Coordinator, Civil Defense (CD) has a warning system which is implemented during times of high flow. CD also has evacuation plans should such be needed. |

APPENDIX

C

Hydrologic & Hydraulic Data

TABLE OF CONTENTS - APPENDIX C

HYDRAULICS & HYDROLOGY

DEVELOPMENT OF CLARK UNIT HYDROGRAPH PARAMETERS

SHEETS 1-2

HEC - 1 DAM SAFETY VERSION COMPUTER OUTPUT

SHEETS 3-23



OBRIEN & GERE

| | | | | |
|------------------------|-------|----|---------|--------------|
| SUBJECT | SHEET | BY | DATE | JOB NO. |
| Chapin's Mill Lake Dam | 1 | SM | 4/23/79 | 1300-005-113 |

1st 5/25/79

INPUT VALUES FOR CLARK HYDROGRAPH

$$T_c + R = 2.1 \left(\frac{DA}{S} \right)^{.22} \times S_t^{.33} \times (1 + 0.3I)^{-0.28}$$

DA = drainage area = 25.5 Sq Miles

S = avg. channel slope measured from the 10% and 85% points along the stream length (ft/mile)

I = % impervious surface within the drainage area.

$$R / (T_c + R) = 0.76$$

S_t = storage (% of lakes and swamps)

$$L = 24.6 \times 2000 = 49,200 \text{ ft}$$

$$0.1L = 4920 \text{ ft} \quad (EL = 40.00)$$

$$0.15L = 7380 \text{ ft} \quad (EL = 120)$$

$$L' = 49,200 - (7380 + 4920) = 36,900 \text{ ft} \approx 7 \text{ miles}$$

$$S = \frac{120 - 40}{7} = 11.4 \text{ feet/mile}$$

$$\text{Area} = 4.5 \text{ Sq. Miles}$$

swamp lake

$$S_t = \frac{4.5}{25.5} \times 0.177 = 17.7\%$$



OBRIEN & GERE

| | | | | |
|-------------------------|-------|----|---------|--------------|
| SUBJECT | SHEET | BY | DATE | JOB NO. |
| Oliphants Mill Lake Dam | 2 | SM | 4/23/79 | 1600-005-113 |

5/25/79

$$I = 0.117 \times D^{0.792 - 0.039 \log D} \quad \left(\text{USGS - Special Report 38} \right)$$

$D =$ population density in persons per square mile

$$D = \frac{2000}{25.5} = 78 \text{ persons/Sq. mile}$$

$$I = 0.117 \times 78^{0.792 - 0.039 \log 78} = 2.7$$

$$T_c + R = 21 \left(\frac{25.5}{11.4} \right)^{.22} \times 17.7^{.33} \times \left(1 + 0.3 \times 2.70 \right)^{-0.28} \text{ say } = 53.4$$

$$\frac{R}{T_c + R} = 0.76 \quad \left(\text{from Phila CoE} \right)$$

$$R = 0.76 (T_c + R) = 0.76 \times 54.6 = 41.5$$

$$T_c + 41.5 = 54.6$$

$$T_c = 13.1 \quad \text{say } \underline{\underline{13.0}}$$

 FLUDD HYDROGRAPH PACKAGE (REV-1)
 QA SAFETY VERSION JULY 1974
 LAST MODIFICATION 26 FEB 79

QUN DATE 07/12/79
 TIME 10.04.30.

NATIONAL DAM INSPECTION PROGRAM
 OLIPHANTS MILL DAM
 PMF HYDROGRAPH

SH 3

| JOB SPECIFICATION | | | | | | | | | |
|-------------------|----|------|-------|-----|-------|-------|------|------|-------|
| NO | MM | NMIN | IDAY | IMR | IMIN | METRC | IPLT | IPRT | NSTAN |
| 300 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| | | | JOPER | NMT | LROPT | TRACE | | | |
| | | | 5 | 0 | 0 | 0 | | | |

MULTI-PLAN ANALYSES TO BE PERFORMED

PLAN= 1 NRTIO= 7 LRTIO= 1
 RTIOS= .05 .10 .15 .20 .30 .40 .50

SUR-AREA RUNOFF COMPUTATION

RUNOFF TO OLIPHANTS MILL DAM RESERVOIR

| ISTAO | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|-------|-------|-------|-------|------|------|-------|--------|-------|
| INFLW | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

HYDROGRAPH DATA

| INQ | TAPEA | SNAP | TRSDA | TRSPC | RATIO | ISNOW | ISAME | LOCAL |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 0 | 25.50 | 0.00 | 25.50 | 0.000 | 0 | 1 | 0 |

PRECIP DATA

| SPFE | PMS | R6 | R12 | R24 | R48 | R72 | R96 |
|------|-------|--------|--------|--------|--------|------|------|
| 0.00 | 23.50 | 104.00 | 114.00 | 124.00 | 135.00 | 0.00 | 0.00 |

LOSS DATA

| LRPT | STRT | DLT43 | RTIOI | ERAIN | ST4KS | RTIOK | STRTL | CNSTL | ALSMX | RTIMP |
|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 3 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | .05 | 0.00 | 0.00 |

UNIT HYDROGRAPH DATA

IC= 13.00 R= 40.60 NTA= 0

STARTO= -1.50 QMCSN= -.05 RTIOR= 2.00

| UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES. LAG= 13.44 HOURS. CP= .28 VOL= .99 | | | | | | | | | |
|---|------|------|------|------|------|------|------|------|------|
| 17. | 94. | 131. | 208. | 277. | 325. | 340. | 330. | 314. | 299. |
| 185. | 271. | 248. | 245. | 236. | 222. | 212. | 202. | 192. | 183. |
| 174. | 175. | 150. | 143. | 136. | 129. | 123. | 117. | 112. | 68. |
| 106. | 101. | 92. | 87. | 83. | 79. | 75. | 72. | 44. | 42. |
| 62. | 54. | 56. | 53. | 51. | 48. | 44. | 44. | 44. | 42. |

SH 3

TRAPC COMPUTED BY THE PROGRAM IS .831

SK4

SK4

| MO. DA | TH. MN. | PERIOD | RAIN | EXCS | LOSS | END-OF-PERIOD COMP Q | FLOW MO. DA | HR. MN | PERIOD | RAIN | EXCS | LOSS | COMP Q |
|---------|---------|--------|-------|-------|------|----------------------|-------------|--------|--------|------|------|------|--------|
| 38. 40. | 36. 22. | 1 | .02 | 0.00 | .02 | 36. | 1.13 | 14.00 | 151 | 0.00 | 0.00 | 0.00 | 25. |
| 24. 23. | 13. 4. | 2 | .02 | 0.00 | .02 | 33. | 1.13 | 16.00 | 152 | 0.00 | 0.00 | 0.00 | 16. |
| 15. 9. | 8. 5. | 3 | .02 | 0.00 | .02 | 31. | 1.13 | 18.00 | 153 | 0.00 | 0.00 | 0.00 | 9. |
| 6. 5. | | 4 | .06 | 0.00 | .06 | 29. | 1.13 | 20.00 | 154 | 0.00 | 0.00 | 0.00 | 6. |
| | | 5 | .06 | 0.00 | .06 | 27. | 1.13 | 22.00 | 155 | 0.00 | 0.00 | 0.00 | 6. |
| | | 6 | .06 | 0.00 | .06 | 25. | 1.14 | 0.00 | 156 | 0.00 | 0.00 | 0.00 | 6. |
| | | 7 | .47 | 0.00 | .47 | 24. | 1.14 | 2.00 | 157 | 0.00 | 0.00 | 0.00 | 5. |
| | | 8 | .95 | .60 | .36 | 32. | 1.14 | 4.00 | 158 | 0.00 | 0.00 | 0.00 | 5. |
| | | 9 | .38 | .28 | .10 | 63. | 1.14 | 6.00 | 159 | 0.00 | 0.00 | 0.00 | 5. |
| | | 10 | .03 | 0.00 | .03 | 115. | 1.14 | 8.00 | 160 | 0.00 | 0.00 | 0.00 | 4. |
| | | 11 | .03 | 0.00 | .03 | 179. | 1.14 | 10.00 | 161 | 0.00 | 0.00 | 0.00 | 4. |
| | | 12 | .03 | 0.00 | .03 | 240. | 1.14 | 12.00 | 162 | 0.00 | 0.00 | 0.00 | 4. |
| | | 13 | .26 | .16 | .10 | 289. | 1.14 | 14.00 | 163 | 0.00 | 0.00 | 0.00 | 3. |
| | | 14 | .26 | .16 | .10 | 320. | 1.14 | 16.00 | 164 | 0.00 | 0.00 | 0.00 | 3. |
| | | 15 | .26 | .16 | .10 | 338. | 1.14 | 18.00 | 165 | 0.00 | 0.00 | 0.00 | 3. |
| | | 16 | .65 | .55 | .10 | 365. | 1.14 | 20.00 | 166 | 0.00 | 0.00 | 0.00 | 3. |
| | | 17 | .65 | .55 | .10 | 420. | 1.14 | 22.00 | 167 | 0.00 | 0.00 | 0.00 | 3. |
| | | 18 | .65 | .55 | .10 | 510. | 1.15 | 0.00 | 168 | 0.00 | 0.00 | 0.00 | 2. |
| | | 19 | 5.28 | 5.18 | .10 | 711. | 1.15 | 2.00 | 169 | 0.00 | 0.00 | 0.00 | 2. |
| | | 20 | 10.76 | 10.66 | .10 | 1248. | 1.15 | 4.00 | 170 | 0.00 | 0.00 | 0.00 | 2. |
| | | 21 | 4.26 | 4.16 | .10 | 2662. | 1.15 | 6.00 | 171 | 0.00 | 0.00 | 0.00 | 2. |
| | | 22 | .39 | .29 | .10 | 3637. | 1.15 | 8.00 | 172 | 0.00 | 0.00 | 0.00 | 2. |
| | | 23 | .39 | .29 | .10 | 5126. | 1.15 | 10.00 | 173 | 0.00 | 0.00 | 0.00 | 2. |
| | | 24 | .39 | .29 | .10 | 6442. | 1.15 | 12.00 | 174 | 0.00 | 0.00 | 0.00 | 2. |
| | | 25 | 0.00 | 0.00 | 0.00 | 7331. | 1.15 | 14.00 | 175 | 0.00 | 0.00 | 0.00 | 2. |
| | | 26 | 0.00 | 0.00 | 0.00 | 7660. | 1.15 | 16.00 | 176 | 0.00 | 0.00 | 0.00 | 1. |
| | | 27 | 0.00 | 0.00 | 0.00 | 7549. | 1.15 | 18.00 | 177 | 0.00 | 0.00 | 0.00 | 1. |
| | | 28 | 0.00 | 0.00 | 0.00 | 7260. | 1.15 | 20.00 | 178 | 0.00 | 0.00 | 0.00 | 1. |
| | | 29 | 0.00 | 0.00 | 0.00 | 6940. | 1.15 | 22.00 | 179 | 0.00 | 0.00 | 0.00 | 1. |
| | | 30 | 0.00 | 0.00 | 0.00 | 6617. | 1.16 | 0.00 | 180 | 0.00 | 0.00 | 0.00 | 1. |
| | | 31 | 0.00 | 0.00 | 0.00 | 6300. | 1.16 | 2.00 | 181 | 0.00 | 0.00 | 0.00 | 1. |
| | | 32 | 0.00 | 0.00 | 0.00 | 5997. | 1.16 | 4.00 | 182 | 0.00 | 0.00 | 0.00 | 1. |
| | | 33 | 0.00 | 0.00 | 0.00 | 5709. | 1.16 | 6.00 | 183 | 0.00 | 0.00 | 0.00 | 1. |
| | | 34 | 0.00 | 0.00 | 0.00 | 5434. | 1.16 | 8.00 | 184 | 0.00 | 0.00 | 0.00 | 1. |
| | | 35 | 0.00 | 0.00 | 0.00 | 5173. | 1.16 | 10.00 | 185 | 0.00 | 0.00 | 0.00 | 1. |
| | | 36 | 0.00 | 0.00 | 0.00 | 4924. | 1.16 | 12.00 | 186 | 0.00 | 0.00 | 0.00 | 1. |
| | | 37 | 0.00 | 0.00 | 0.00 | 4687. | 1.16 | 14.00 | 187 | 0.00 | 0.00 | 0.00 | 1. |
| | | 38 | 0.00 | 0.00 | 0.00 | 4462. | 1.16 | 16.00 | 188 | 0.00 | 0.00 | 0.00 | 1. |
| | | 39 | 0.00 | 0.00 | 0.00 | 4247. | 1.16 | 18.00 | 189 | 0.00 | 0.00 | 0.00 | 1. |
| | | 40 | 0.00 | 0.00 | 0.00 | 4043. | 1.16 | 20.00 | 190 | 0.00 | 0.00 | 0.00 | 1. |
| | | 41 | 0.00 | 0.00 | 0.00 | 3849. | 1.16 | 22.00 | 191 | 0.00 | 0.00 | 0.00 | 0. |
| | | 42 | 0.00 | 0.00 | 0.00 | 3664. | 1.17 | 0.00 | 192 | 0.00 | 0.00 | 0.00 | 0. |
| | | 43 | 0.00 | 0.00 | 0.00 | 3487. | 1.17 | 2.00 | 193 | 0.00 | 0.00 | 0.00 | 0. |
| | | 44 | 0.00 | 0.00 | 0.00 | 3320. | 1.17 | 4.00 | 194 | 0.00 | 0.00 | 0.00 | 0. |
| | | 45 | 0.00 | 0.00 | 0.00 | 3160. | 1.17 | 6.00 | 195 | 0.00 | 0.00 | 0.00 | 0. |
| | | 46 | 0.00 | 0.00 | 0.00 | 3008. | 1.17 | 8.00 | 196 | 0.00 | 0.00 | 0.00 | 0. |
| | | 47 | 0.00 | 0.00 | 0.00 | 2864. | 1.17 | 10.00 | 197 | 0.00 | 0.00 | 0.00 | 0. |
| | | 48 | 0.00 | 0.00 | 0.00 | 2726. | 1.17 | 12.00 | 198 | 0.00 | 0.00 | 0.00 | 0. |
| | | 49 | 0.00 | 0.00 | 0.00 | 2595. | 1.17 | 14.00 | 199 | 0.00 | 0.00 | 0.00 | 0. |
| | | 50 | 0.00 | 0.00 | 0.00 | 2470. | 1.17 | 16.00 | 200 | 0.00 | 0.00 | 0.00 | 0. |
| | | 51 | 0.00 | 0.00 | 0.00 | 2351. | 1.17 | 18.00 | 201 | 0.00 | 0.00 | 0.00 | 0. |
| | | 52 | 0.00 | 0.00 | 0.00 | 2238. | 1.17 | 20.00 | 202 | 0.00 | 0.00 | 0.00 | 0. |
| | | 53 | 0.00 | 0.00 | 0.00 | 2131. | 1.17 | 22.00 | 203 | 0.00 | 0.00 | 0.00 | 0. |

| | | | | | | | | | | | | | | | | |
|------|-------|-----|------|------|------|-----|------|-------|-----|------|------|------|---------|---------|--------|---------|
| 1.10 | 16.00 | 116 | 0.30 | 0.00 | 0.00 | 90. | 1.23 | 4.00 | 266 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.10 | 14.00 | 117 | 0.30 | 0.00 | 0.00 | 69. | 1.23 | 6.00 | 267 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.10 | 20.00 | 118 | 0.00 | 0.00 | 0.00 | 79. | 1.23 | 8.00 | 268 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.10 | 22.00 | 119 | 0.00 | 0.00 | 0.00 | 73. | 1.23 | 10.00 | 269 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.10 | 0.00 | 120 | 0.00 | 0.00 | 0.00 | 68. | 1.23 | 12.00 | 270 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 2.00 | 121 | 0.00 | 0.00 | 0.00 | 64. | 1.23 | 14.00 | 271 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 4.00 | 122 | 0.00 | 0.00 | 0.00 | 60. | 1.23 | 16.00 | 272 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 6.00 | 123 | 0.00 | 0.00 | 0.00 | 56. | 1.23 | 18.00 | 273 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 8.00 | 124 | 0.00 | 0.00 | 0.00 | 52. | 1.23 | 20.00 | 274 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 10.00 | 125 | 0.00 | 0.00 | 0.00 | 48. | 1.23 | 22.00 | 275 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 12.00 | 126 | 0.00 | 0.00 | 0.00 | 45. | 1.24 | 0.00 | 276 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 14.00 | 127 | 0.00 | 0.00 | 0.00 | 42. | 1.24 | 2.00 | 277 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 16.00 | 128 | 0.00 | 0.00 | 0.00 | 39. | 1.24 | 4.00 | 278 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 18.00 | 129 | 0.00 | 0.00 | 0.00 | 37. | 1.24 | 6.00 | 279 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 20.00 | 130 | 0.00 | 0.00 | 0.00 | 34. | 1.24 | 8.00 | 280 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.11 | 22.00 | 131 | 0.00 | 0.00 | 0.00 | 32. | 1.24 | 10.00 | 281 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 0.00 | 132 | 0.00 | 0.00 | 0.00 | 30. | 1.24 | 12.00 | 282 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 2.00 | 133 | 0.00 | 0.00 | 0.00 | 28. | 1.24 | 14.00 | 283 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 4.00 | 134 | 0.00 | 0.00 | 0.00 | 26. | 1.24 | 16.00 | 284 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 6.00 | 135 | 0.00 | 0.00 | 0.00 | 24. | 1.24 | 18.00 | 285 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 8.00 | 136 | 0.00 | 0.00 | 0.00 | 23. | 1.24 | 20.00 | 286 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 10.00 | 137 | 0.00 | 0.00 | 0.00 | 21. | 1.24 | 22.00 | 287 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 12.00 | 138 | 0.00 | 0.00 | 0.00 | 20. | 1.25 | 0.00 | 288 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 14.00 | 139 | 0.00 | 0.00 | 0.00 | 18. | 1.25 | 2.00 | 289 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 16.00 | 140 | 0.00 | 0.00 | 0.00 | 17. | 1.25 | 4.00 | 290 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 18.00 | 141 | 0.00 | 0.00 | 0.00 | 16. | 1.25 | 6.00 | 291 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 20.00 | 142 | 0.00 | 0.00 | 0.00 | 15. | 1.25 | 8.00 | 292 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.12 | 22.00 | 143 | 0.00 | 0.00 | 0.00 | 14. | 1.25 | 10.00 | 293 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.13 | 0.00 | 144 | 0.00 | 0.00 | 0.00 | 13. | 1.25 | 12.00 | 294 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.13 | 2.00 | 145 | 0.00 | 0.00 | 0.00 | 12. | 1.25 | 14.00 | 295 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.13 | 4.00 | 146 | 0.00 | 0.00 | 0.00 | 11. | 1.25 | 16.00 | 296 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.13 | 6.00 | 147 | 0.00 | 0.00 | 0.00 | 11. | 1.25 | 18.00 | 297 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.13 | 8.00 | 148 | 0.00 | 0.00 | 0.00 | 10. | 1.25 | 20.00 | 298 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.13 | 10.00 | 149 | 0.00 | 0.00 | 0.00 | 9. | 1.25 | 22.00 | 299 | 0.00 | 0.00 | 0.00 | 0. | | | |
| 1.13 | 12.00 | 150 | 0.00 | 0.00 | 0.00 | 9. | 1.26 | 0.00 | 300 | 0.00 | 0.00 | 0.00 | 0. | | | |
| SUM | | | | | | | | | | | | | 26.35 | 23.88 | 2.47 | 196211. |
| | | | | | | | | | | | | | (669.) | (606.) | (63.) | 5556.08 |

HYDROGRAPH AT STAINFLOW FOR PLAN 1. RTIO 1

| | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|-------------|------|--------|---------|---------|-------|--------|
| CFS | 38.3 | 375. | 327. | 216. | 9810. | |
| CUS | 11. | 11. | 9. | 6. | 274. | |
| 1-AC-ES | | 1.4 | 1.8 | 94 | 1.19 | |
| 4W | | 3.48 | 12.11 | 23.97 | 30.30 | |
| AC-E-T | | 186. | 648. | 1283. | 1621. | |
| 1-POUS CU-W | | 239. | 799. | 1582. | 2000. | |

HYDROGRAPH AT STAINFLOW FURN PLAN 1. RTIO 2

| | | | | |
|------------|--------|---------|---------|--------------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
| 764. | 750. | 653. | 431. | 19620. |
| 22. | 21. | 14. | 12. | 556. |
| CFS | | | | |
| CMS | | | | |
| INCHES | | | | |
| 44 | 6.95 | 24.21 | 47.94 | 60.60 |
| AC-FT | 372. | 1296. | 2565. | 3243. |
| THOUS CU Y | 459. | 1594. | 3164. | 4000. |

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 3

| | | | | |
|------------|--------|---------|---------|--------------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
| 1145. | 1125. | 940. | 647. | 29430. |
| 33. | 32. | 24. | 18. | 833. |
| CFS | | | | |
| CMS | | | | |
| INCHES | | | | |
| 44 | 10.43 | 36.32 | 71.90 | 90.90 |
| AC-FT | 558. | 1944. | 3848. | 4864. |
| THOUS CU Y | 688. | 2397. | 4746. | 6000. |

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 4

| | | | | |
|------------|--------|---------|---------|--------------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
| 1532. | 1500. | 1306. | 862. | 39239. |
| 43. | 42. | 37. | 24. | 1111. |
| CFS | | | | |
| CMS | | | | |
| INCHES | | | | |
| 44 | 13.90 | 48.42 | 95.87 | 121.20 |
| AC-FT | 744. | 2591. | 5131. | 6486. |
| THOUS CU Y | 918. | 3196. | 6329. | 8000. |

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 5

| | | | | |
|------------|--------|---------|---------|--------------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
| 2239. | 2251. | 1960. | 1293. | 58859. |
| 65. | 64. | 53. | 37. | 1667. |
| CFS | | | | |
| CMS | | | | |
| INCHES | | | | |
| 44 | 20.85 | 72.63 | 143.81 | 181.79 |
| AC-FT | 1116. | 3887. | 7696. | 9729. |
| THOUS CU Y | 1377. | 4795. | 9493. | 12000. |

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 6

| | | | | |
|------------|--------|---------|---------|--------------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
| 3064. | 3001. | 2613. | 1724. | 78474. |
| 87. | 85. | 74. | 49. | 2222. |
| CFS | | | | |
| CMS | | | | |
| INCHES | | | | |
| 44 | 1.09 | 3.41 | 7.55 | 9.54 |
| AC-FT | 27.80 | 96.45 | 191.75 | 242.39 |
| THOUS CU Y | 1488. | 5183. | 10261. | 12972. |
| | 1835. | 6393. | 12657. | 16000. |

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 7

| | | | | |
|------|--------|---------|---------|--------------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------|--------|---------|---------|--------------|

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| HYDROGRAPH ROUTING | | | | | | | | | | | | | | |
|--|-------|--------------|-------|-------|-------|-------|--------|--------|--|--|--|--|--|--|
| ROUTING T-ROUGH OLIPHANTS MILL DAM RESERVOIR | | | | | | | | | | | | | | |
| INSTAQ | ICOMP | IECON | ITAPE | JPLI | JPRT | INAME | ISTAGE | IAUTO | | | | | | |
| OUTFLO | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | | | | | | |
| | | ROUTING DATA | | | | | | | | | | | | |
| | | AVG | IRES | ISAME | IOPT | IPMP | LSTR | | | | | | | |
| ULOSS | 0.0 | 0.00 | 1 | 1 | 0 | 0 | 0 | | | | | | | |
| | | NSTD | LAG | AMSK | X | TSK | STORA | ISPRAT | | | | | | |
| | 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | -29. | 0 | | | | | | |

HYDROGRAPH ROUTING

ROUTING T-ROUGH OLIPHANTS WILL DAM RESERVOIR

| | ISTAD | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|---------|-------|--------|--------------|-------|------|-------|-------|--------|-------|
| OUTFLOW | 0.00 | 1 | | | 0 | 0 | I | 0 | 0 |
| CLOSS | 0.00 | AVG | ROUTING DATA | | | | | | |
| | 0.00 | 0.00 | IREC | ISAME | IOPT | IPMP | LSTR | | |
| | | | 1 | 1 | 0 | 0 | | | |
| NSTPS | 1 | *STDCL | LAG | AMSK4 | X | TSK | STORA | ISPRT | |
| | | | 0 | 0 | 0.00 | 0.000 | -29. | 0 | |

| | | | |
|--------------|-----|-----|------|
| SURFACE AREA | 0. | 30. | 250. |
| CAPACITY | 0. | 90. | 134. |
| ELEVATION | 20. | 29. | 40. |

| DAM DATA | | | |
|----------|------|------|-------|
| TOPEL | COOU | EXPO | DAMWD |
| 31.2 | 3.1 | 1.5 | 136. |

STATION OUTFLO, PLAN 1: RATIO 1:

END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

五

| | | | |
|-------|-------|-------|-------|
| 61 | 1.42 | 2.83 | 3.58 |
| 10.36 | 36.11 | 71.82 | 91.01 |
| 554. | 1931. | 3843. | 4870. |
| 684. | 2344. | 4741. | 6007. |

100

SH 14

45 45

[illegible]

[illegible]

DE:K OUTFLOW IS 3405. AT TIME 54.00 HOURS

[illegible]

12 48

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

| STATION | PLAN | AREA | RATIOS APPLIED TO FLOWS | | | | | | |
|----------------------|----------|----------|-------------------------|----------|----------|----------|----------|-----------|-----------|
| | | | RATIO 1 | RATIO 2 | RATIO 3 | RATIO 4 | RATIO 5 | RATIO 6 | RATIO 7 |
| | | | .05 | .10 | .15 | .20 | .30 | .40 | .50 |
| HYDROGRAPH AT INFLOW | 1 | 25.50 | 383. | 766. | 1149. | 1532. | 2294. | 3064. | 3830. |
| | (10.85) | (66.04) | (21.69) | (32.54) | (43.38) | (55.07) | (86.76) | (108.46) | (135.58) |
| ROUTED TO | 1 | 25.50 | 377. | 760. | 1141. | 1522. | 2243. | 3044. | 3805. |
| | (10.69) | (66.04) | (21.53) | (32.32) | (43.10) | (54.64) | (86.19) | (107.74) | (134.68) |

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

| | | | | | | | |
|--------------------|----------------------------------|-------------------------------------|--------------------------------------|-------------------------------------|-------------------------------|---------------------------------|-----------------------------|
| | ELEVATION STORAGE OUTFLOW | INITIAL VALUE 29.10 93. 7. | SPILLWAY CREST 29.00 90. 0. | TOP OF DAM 31.17 182. 691. | | | |
| | MAXIMUM RESERVOIR W.S.ELEV | MAXIMUM DEPTH OVER DAM | MAXIMUM STORAGE AC-FT | MAXIMUM OUTFLOW CFS | DURATION OVER TOP HOURS | TIME OF MAX OUTFLOW HOURS | TIME OF FAILURE HOURS |
| RATIO OF PMF | | | | | | | |
| .05 | 30.55 | 0.00 | 145. | 377. | 0.00 | 54.00 | 0.00 |
| .10 | 31.28 | .11 | 189. | 760. | 8.00 | 54.00 | 0.00 |
| .15 | 31.72 | .55 | 216. | 1141. | 28.00 | 54.00 | 0.00 |
| .20 | 32.07 | .90 | 239. | 1522. | 42.00 | 54.00 | 0.00 |
| .30 | 32.66 | 1.49 | 283. | 2283. | 62.00 | 54.00 | 0.00 |
| .40 | 33.17 | 2.00 | 326. | 3044. | 72.00 | 54.00 | 0.00 |
| .50 | 33.64 | 2.47 | 369. | 3805. | 84.00 | 54.00 | 0.00 |

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APPENDIX

D

Photographs



OVERALL UPSTREAM VIEW OF THE DAM
WITH THE LAKE PARTIALLY DRAWN DOWN 4/13/79



OVERALL VIEW OF THE SPILLWAY SHOWING SAND FILL
ON THE UPSTREAM SIDE OF THE TIMBER HEADWALL
AND ROCK FILL ON THE DOWNSTREAM SIDE 4/13/79



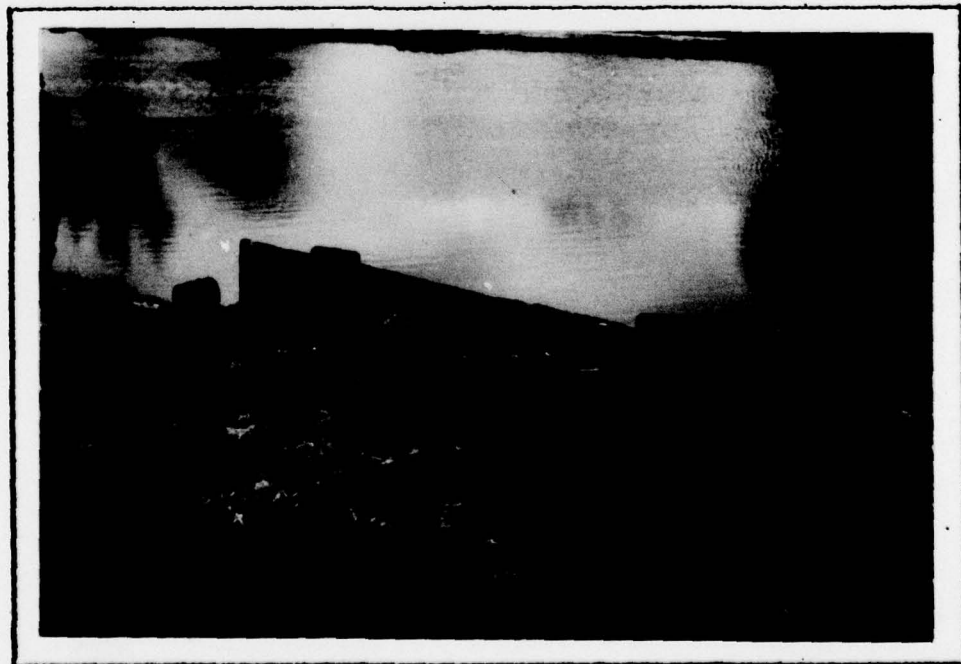
RIGHT SIDE OF THE SPILLWAY
WITH THE LAKE PARTIALLY DRAWN DOWN 4/13/79



RESERVOIR DRAIN SYSTEM INLET TRASH RACK
GATE HOIST AND HOIST SUPPORT 4/13/79



*RIGHT SIDE OF THE SPILLWAY WITH THE
RESERVOIR DRAIN IN THE FOREGROUND 4/13/79*



*DETAILS OF THE RIGHT SIDE OF
THE TIMBER SPILLWAY 4/13/79*



*DETERIORATED TIMBER MEMBERS
IN THE SPILLWAY HEADWALL 4/13/79*

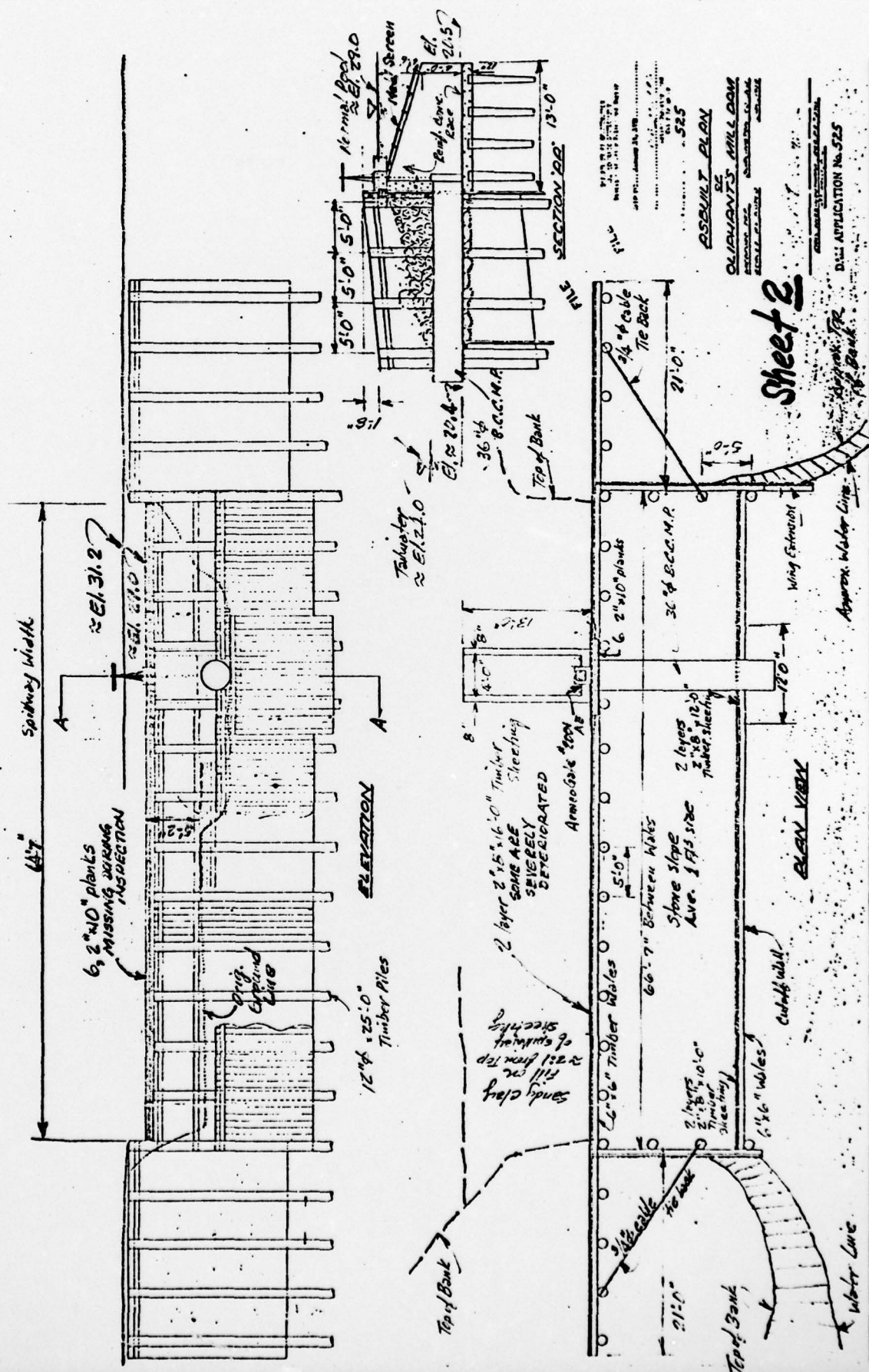


*OVERALL DOWNSTREAM
VIEW OF THE DAM 4/13/79*

APPENDIX

E

Drawings



APPENDIX

F

Site Geology

SITE GEOLOGY

OLIPHANTS MILL LAKE DAM

Oliphants Mill Lake is located in the Coastal Plain physiographic province which is composed of unconsolidated sedimentary deposits. These beds form a wedge-shaped mass that is exposed at the fall line and thickens in a southeasterly direction towards the Atlantic Ocean.

The surficial deposit at the dam consists of a series of Tertiary sands comprising the Kirkwood formation. No faults or major structural defects are noted in the vicinity of the dam or lake.

